ARTICLE

Consultant pharmacist case management of older people in intermediate care: a new innovative model

E.F. Ruth Miller PhD, Carmel M. Darcy MSc, Anne B.M. Friel MSc, Michael G. Scott PhD and Stephen B. Toner MSc

a Lead Pharmacist, Research and Clinical Trials, Altnagelvin Area Hospital, Londonderry and School of Pharmacy and Pharmaceutical Science, Ulster University, Coleraine, UK
b Consultant Pharmacist (Older People), Altnagelvin Area Hospital, Londonderry, UK
c Head of Pharmacy and Medicines Management, Western Health and Social Care Trust, Londonderry, UK
d Head of Pharmacy and Medicines Management, and Director of the Northern Ireland Medicines Optimisation Innovation Centre, Northern Health and Social Care Trust, Antrim, UK
e Lead Clinical Pharmacist (Surgical Directorate), Antrim Area Hospital, Antrim, UK

Abstract
Rationale, Aims and Objectives: In 2011, ‘Transforming Your Care’ outlined the remodelling of Health and Social Care in Northern Ireland (HSCNI) UK, specifically recommending better integration of hospital and community services for older people. This work aimed to evaluate consultant pharmacist case management for older patients admitted from acute to intermediate care continuing back into the community setting, given the importance of such a transition to person-centered healthcare.

Method: On transfer to intermediate care, the consultant pharmacist determined the Medication Appropriateness Index (MAI) for each drug prescribed. Individualised pharmaceutical care plans were implemented with clinical interventions recorded and graded using Eadon criteria. Cost savings resulting from interventions which prevent medication errors/Adverse Drug Events (ADEs) have been estimated using the model as described by the University of Sheffield School of Health and Related Research (ScHARR); these were applied. Drugs stopped/started were costed using the NHS dictionary of medicines and devices (dm+d). Case management continued via communication with GPs and/or community pharmacists and post-discharge patient telephone calls/home visits.

Results: Three hundred and fifty-five patients had 3674 drugs assessed for medication appropriateness; both individual and total drug MAI scores on admission to and discharge from intermediate care, were significantly reduced (Wilcoxon signed rank test, p<0.001, n=355). An average of 2.5 clinical interventions per patient were made, with 84% being self-graded as Eadon ≥ Grade 4 (significant interventions resulting in improved care standards). Clinical interventions yielded potential savings of £63-144k per annum whilst annual drug cost savings were £68k.

Conclusion: This project demonstrated consultant pharmacist case management results in both cost savings and more appropriate prescribing with safer, seamless and more person-centered care.

Keywords
Case management, consultant pharmacist, cost savings, intermediate care, medication appropriateness older people, person-centered healthcare, pharmaceutical care

Correspondence address
Dr Ruth Miller, Office 7, Pharmacy Department, Altnagelvin Area Hospital, Glenshane Road, Derry, BT47 6SB, UK.
E-mail: ruth.miller@westerntrust.hscni.net

Accepted for publication: 24 June 2015

Introduction

The Western Health and Social Care Trust (WHSCT) in Northern Ireland, UK, serves a population of approximately 230,000 people with 12% of people being aged ≥ 65 years old [1]. Population projections predict an overall increase of 32% in the number of people aged 60 and over living in the Western area by 2020; this represents the largest single increase of any Health and Social Care area in Northern Ireland and is significantly above the projected average increase for Northern Ireland as a whole [2].

The National Service Framework (NSF) for Older People set out a plan for optimal health and social care for the start of the 21st century [3]; this heralded a move within the NHS towards more patient-/person-centred multidisciplinary care being delivered in the community setting, as opposed to the traditional model of hospital care. This new model of care has been referred to as ‘Intermediate Care’ with older patients being the main
recipients of this ‘new’ type of complex healthcare provision [4]. Specific to Northern Ireland, the Compton Review ‘Transforming Your Care’ outlined the proposed local remodelling of Health and Social Care. It recommended that there should be better integration of hospital and community services for older patients and also stated that there was now the opportunity to create greater provision of intermediate care [5]. Case management has been defined as ‘the process of planning, co-ordinating, managing and reviewing the care of an individual’ [6]. The broad aim is to develop cost effective and efficient ways of co-ordinating services in order to improve the quality of life’. There are different models of case management in chronic care. However, the broad principle is to assign each person a ‘case manager’ to: assess patients’ needs, develop a care plan, arrange suitable care, monitor the quality of care and maintain contact with the patient and their family [7].

In 2003, ‘A Vision for Pharmacy in the new NHS’ called for the establishment of consultant pharmacists’ posts. It stated that Consultant Pharmacists should support medicines management in hospitals, play a leading role in training pharmacists and other healthcare professionals and should be well placed to influence the use of medicines across the wider healthcare community’ [8]. This project addressed all proposed strategies by establishing new integrated pharmaceutical care services for older people within the intermediate care setting and introducing the consultant pharmacist role tasked with case managing older patients across the healthcare interfaces.

Methods

Prior to project design and initiation, a multidisciplinary process mapping day facilitated by a Lean-trained facilitator was held. This was attended by: the project manager; consultant pharmacist; lead consultant; junior doctors; assistant directors; the head of pharmacy and medicines management and intermediate care ward managers. This resulted in mapping out of the system whereby patients passed through from acute to primary care via the intermediate care setting and helped to steer the direction of the project using a collaborative approach. Opinion was then sought on the proposed project design from the WHSCT research governance committee which confirmed the project to be service improvement and evaluation not requiring any research governance or ethical approvals.

The new pharmaceutical care service was implemented in Waterside Hospital, a 48-bed intermediate care step-down community hospital located close to Altnagelvin Area Hospital, a large teaching hospital in the North West region of Northern Ireland. The hospital consists of 5 wards, with 2 of the 5 being devoted to psycho-geriatric/dementia patients; these 2 wards were not included in the project. The remaining 3 wards are divided between sub-acute and rehabilitative care. Prior to this project, the role of pharmacy had been ‘supply only’ with no clinical pharmacist input to the care of older people admitted to this nurse-led facility.

The consultant pharmacist case management model (Figure 1) consisted of the consultant pharmacist assuming pharmaceutical care responsibility for the patient throughout their stay in intermediate care and for a minimum of 30 days post-discharge. On admission to Waterside Hospital, the consultant pharmacist assessed each patient’s medications and determined the appropriateness of each drug and regimen as a whole using the Medication Appropriateness Index (MAI) [9,10]. Based on this, medications were stopped, started or amended. Clinical interventions made on admission and throughout the patient stay in Waterside, were recorded and graded according to the Eadon criteria [11], a scale ranging from one to 6, where grades ≥4 indicate a significant intervention resulting in improved standards of patient care which ultimately prevent major organ damage to the patient or even death. A written Pharmaceutical Care Plan (PCP) was then implemented for each patient.

Medication-related educational needs and adherence issues for patients and their carers were identified and addressed by the consultant pharmacist on either an individual or group basis. Contact was made with both the GP and community pharmacist as needed on discharge. Case management continued via a follow-up telephone call to the patient and/or a home visit dependent upon identified patient and carer needs; clinical interventions made at this time were also recorded, categorised and graded.

Data on clinical interventions and their grading were downloaded into Microsoft Excel (Office 2010) for analysis. Specific patient data including demographics, medical and medication history, MAI scores and outcomes, for example, unplanned 90-day re-admission rates were entered into the Statistical Package for the Social Sciences (SPSS) version 21 for analysis. Drugs which were stopped and started were primarily costed out using the NHS dictionary of medicines and devices (dm+d) [12] and where no cost was available, the latest edition of the British National Formulary was utilised [13]. Continuous data were plotted, explored and tested for normality of distribution. Dependent upon this, a t-test, Mann-Whitney U (unpaired data) or Wilcoxon signed ranks test (paired data) was applied to the data (results were considered significant when the 2-tailed p value was ≤0.05). Subgroups of interest, for example, those who received a post-discharge telephone call, were selected and explored further using appropriate statistical analysis.

Results

The project was allowed time to embed, with this paper presenting data on those who entered the service over a 12-month period. A complete data set was collated for 453 patients (162 male and 291 female, aged 82.8 ± 7.1 years). The average length of stay in acute care prior to discharge into intermediate care was 16.4 days with subsequent average length of stay in intermediate care being 29.5 days.
One hundred and twenty-seven patients were recorded as widowed, 147 (32.5%) were noted as being married and 70 (15.5%) had never married. Twenty-one patients (4.6%) died during the baseline admission in Waterside hospital. The original source of their admission to acute care was noted with the majority having been living in their own home (n=380, 83.9%) or in a private/residential/trust nursing home (n=55, 12.1%). The average number of drugs taken by these patients (n=453) upon admission to Waterside and after completion of medicines reconciliation, was 10.7 ± 4.3 (Range = 0 to 25).

The MAI of each drug and the total drug regimen was determined on admission to and discharge from, Waterside Hospital; a lower MAI score indicates more appropriate treatment [9,10]. Three hundred and fifty-five patients had 3674 drugs individually assessed for medication appropriateness. Both the individual and total drug MAI scores from admission to and discharge from, intermediate care were reduced by a statistically significant figure (Wilcoxon signed rank test, p<0.001) as shown in Table 1.

A total of 1122 interventions were made by the consultant pharmacist with 84% being self-graded as Eadon Grade 4 or above. Seven interventions were graded at level 5 with none being graded at level 6. Ten drug interventions graded by the consultant pharmacist using Eadon criteria were presented to 4 consultant geriatricians to independently grade and check for consistency of agreement. Examples of interventions included: stopping lidocaine patches and starting more appropriate and effective analgesia; detection of opiate toxicity and sodium valproate not being titrated to the correct therapeutic dose. Reliability analysis of this data yielded a Cronbach’s alpha of 0.909 indicating excellent consistency of interpretation of the scenarios presented.
Table 1 The Medication Appropriateness Index (MAI) scores for drugs on admission to and discharge from Waterside hospital (n=355 patients)

<table>
<thead>
<tr>
<th></th>
<th>MAI on admission to Waterside (individual drug)</th>
<th>MAI on discharge from Waterside (individual drug)</th>
<th>MAI on admission (Total score)</th>
<th>MAI on discharge (Total score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.7</td>
<td>0.2</td>
<td>7.1</td>
<td>2</td>
</tr>
<tr>
<td>Median</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maximum</td>
<td>8</td>
<td>8</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.4</td>
<td>0.7</td>
<td>5.7</td>
<td>2.6</td>
</tr>
<tr>
<td>Variance</td>
<td>2</td>
<td>0.6</td>
<td>32.5</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Table 2 Cost avoidance (reduction in healthcare resource utilisation) as a result of Consultant Pharmacist Clinical Interventions in Intermediate Care over a 12-Month Period

<table>
<thead>
<tr>
<th>Cost Avoidance</th>
<th>ScHARR Model</th>
<th>Eadon Criteria</th>
<th>No. of Interventions Made</th>
<th>Cost Avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially Lethal</td>
<td>1085-2120</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Potentially Serious</td>
<td>713-1484</td>
<td>5</td>
<td>7</td>
<td>4991 - 10 388</td>
</tr>
<tr>
<td>Potentially Significant</td>
<td>65-150</td>
<td>4</td>
<td>943</td>
<td>61 295 - 141 450</td>
</tr>
<tr>
<td>Minor</td>
<td>0-6</td>
<td>1-3</td>
<td>172</td>
<td>0 - 1032</td>
</tr>
<tr>
<td>TOTALS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>66286 - 152870</td>
</tr>
</tbody>
</table>

An intra-class correlation (2-way fixed effects model where people effects are random and measure effects are fixed) of 0.667 (95% confidence interval 0.406, 0.883, p<0.001) represented a good level of agreement between the 5 independent raters. This confirms the validity of the pharmacist self-grading within acceptable parameters, thereby removing potential for bias.

The School of Health and Related Research at Sheffield University (ScHARR), UK has defined the costs related to medication errors and Adverse Drug Events (ADEs) [14,15]. Clinical interventions can potentially lead to prevention of these medication errors and ADEs. Table 2 shows results from both the ScHARR model cost avoidance in terms of reducing healthcare resource utilisation together with the clinical interventions made by the consultant pharmacist over a 12-month period. The opportunity costs are reflective of clinical interventions resulting in possible prevention of subsequent healthcare resource usage which may include: avoidable hospital bed days; subsequent outpatient attendances and reduced non-elective re-admissions.

Approximately one-third of the patients case managed by the consultant pharmacist subsequently received a post-discharge telephone call on average 26.3 ± 11.3 days after discharge (destination to home only). No targeting of patients was used and it can therefore be assumed that those who received a telephone call were randomly selected by the consultant pharmacist resulting in a convenience sample for analysis. Table 3 shows that those who received a follow-up call did not differ significantly from those who did not in terms of their age, number of medicines taken and the appropriateness of drugs prescribed. Initial figures showed that this service could be realistically delivered to 5 patients per week by the consultant pharmacist. Of those who received a telephone call, 15 (10.1%) patients were non-electively re-admitted within 30 days and 27 (18.2%) experienced an unplanned re-admission within 90 days. In contrast, of those who did not receive this telephone follow-up, 51 (16.7%) were non-electively re-admitted within 30 days and 77 (25.2%) experienced an unplanned re-admission within 90 days with this difference tending to statistical significance (Chi-squared, p = 0.092). The follow-up telephone call did not statistically significantly impact upon time to unplanned readmission or length of stay on re-admission.

Sixty-eight (45.9%) patients telephoned by the consultant pharmacist required one or more interventions; these were categorised and then graded according to Eadon criteria. All 122 interventions made were graded at Eadon grade 4. Table 4 categorises the interventions made and potential cost savings on application of SCARR costs.

Of the 431 patients discharged alive from the Waterside Hospital, 66 (15.3%) were non-electively re-admitted to hospital within 30 days and 104 experienced a non-elective re-admission within 90 days (24.1%). Of those who were re-admitted within 90 days, the average length of time to that first re-admission was 18.9 ± 25.6 days and the length of stay on re-admission was 13.4 ± 15.2 days.
Table 3 Comparison of patients in receipt or not of a post-discharge follow-up telephone call from the consultant pharmacist (n=355)

<table>
<thead>
<tr>
<th>Age</th>
<th>No of medicines on admission to Waterside</th>
<th>Total MAI on admission</th>
<th>Total MAI on discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>No phone call (n=207)</td>
<td>82.7 ± 7.3</td>
<td>10.9 ± 4.4</td>
<td>7.2 ± 6</td>
</tr>
<tr>
<td>Received phone call (n=148)</td>
<td>83.0 ± 6.9</td>
<td>10.2 ± 4.1</td>
<td>7.1 ± 5.4</td>
</tr>
<tr>
<td>Statistical significance p value</td>
<td>0.614*</td>
<td>0.113*</td>
<td>0.775*</td>
</tr>
</tbody>
</table>

# Independent samples t-test  *Mann Whitney U

Table 4 Interventions made by the consultant pharmacist in response to a post-discharge telephone call (n=68 patients)

<table>
<thead>
<tr>
<th>Type of intervention</th>
<th>No. of interventions made</th>
<th>Cost saving £ (SchARR model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign Posting</td>
<td>16</td>
<td>1040 – 2400</td>
</tr>
<tr>
<td>Patient Education</td>
<td>50</td>
<td>3250 – 7500</td>
</tr>
<tr>
<td>GP contact required</td>
<td>17</td>
<td>1105 – 2550</td>
</tr>
<tr>
<td>Community pharmacist contact required</td>
<td>5</td>
<td>325 – 750</td>
</tr>
<tr>
<td>Secondary care HP contact required</td>
<td>5</td>
<td>325 – 750</td>
</tr>
<tr>
<td>Dosage adjustment</td>
<td>13</td>
<td>845 – 1950</td>
</tr>
<tr>
<td>Home visit</td>
<td>2</td>
<td>130 – 300</td>
</tr>
<tr>
<td>General advice</td>
<td>14</td>
<td>910 – 2100</td>
</tr>
<tr>
<td>TOTALS</td>
<td>122</td>
<td>7930 – 18300</td>
</tr>
</tbody>
</table>

Ninety-day re-admission rates for patients discharged from Waterside prior to implementation of this service (over the quarter April to June, 2011) were 37.8%, with an initial baseline length of stay being 38.2 ± 40.9 days (versus 29.5 ± 30.8, Range 1-297 days for the 12 month data collection period). There therefore appears to be a large reduction in non-elective re-admissions and length of stay in this intermediate care facility since establishment of this new case management service.

Drugs started and stopped as a result of clinical interventions and medication review by the consultant pharmacist resulted in total savings of £68k per annum. An initial review of drug stocks held on intermediate care wards and the introduction of one stop dispensing also resulted in a one-off saving of £4k.

The total measureable potential savings in terms of reduction in healthcare resource utilisation, drug cost savings and cash release for the duration of this project were estimated in the range of £164.25k to £280k, thereby demonstrating an ‘invest to save’ return in the range of £2.35 to £4.00 per £1.00 invested (based on an annual input cost of £70k).

Discussion

Integrated medicines management by clinical pharmacists is now a recognised and embedded secondary care pharmacy service [16], but this project took the potential role of a clinical pharmacist a stage further to a new healthcare setting outside the traditional settings of either community or secondary care. In line with the ‘Transforming Your Care’ [5] strategy, this case management model placed the consultant pharmacist at the acute, intermediate and community interfaces where they could act as the medicines advocate for older vulnerable patients with complex medicines management needs, while also remaining accessible to other healthcare professionals working in both secondary and primary care. This emphasises the need for this degree of integration along the patient care pathway with the consultant pharmacist providing specialist pharmaceutical care throughout the patient journey through a complex healthcare system with multiple transfers of care.

The application of the MAI gave the consultant pharmacist a comprehensive, albeit time-consuming, tool to use which utilises both explicitly structured questions and implicit judgements; it was therefore dependent upon the clinical knowledge of the pharmacist (assumed to be excellent at consultant pharmacist level), but gave a reliable and quantifiable estimate of how treatment improved and polypharmacy was reduced. Inappropriate prescribing has been reported elsewhere to result in adverse outcomes including increased risk of hospital admission [17] and increased drug costs [18]. Although unplanned re-admissions rates and lengths of stay have been reported here, the authors prefered to focus on patient outcomes which could be confidently attributed to the consultant pharmacist’s role and clinical interventions made based on the patient’s individualised pharmaceutical care plans. This decision was based on the fact that other older people services were introduced during the project.
data collection period, which may also have impacted upon baseline lengths of stay in intermediate care and non-lective re-admission rates. This included implementation of an Older Peoples Assessment Liaison Service (OPALs) and introduction of a daily presence in Waterside Hospital of a medical healthcare professional (SHO).

The improvement in quality of care and in quality of life of patients in receipt of this type of innovative care cannot be quantified in the monetary figures quoted here, but quality is often also associated with increased improvement in patient safety leading to reduced potential adverse events, especially adverse drug events, which may have been previously missed due to lack of pharmaceutical care in this type of intermediate care setting.

This service is ongoing and has received new funding from the Department of Health and Social Services and Public Safety in Northern Ireland (DHSSPSNI). The model will now be rolled out to intermediate care facilities and community hospitals in other trusts by a pharmacy team, inclusive of technical support and being led and mentored by the consultant pharmacist. The model will be evaluated for potential continued cost savings and reproducibility. Results will also inform a new regional strategy for medicines optimisation in older people and will establish a business case for other trusts wishing to implement such a model in line with the regional strategies originally proposed in the ‘Transforming Your Care’ document.

The case management model will also be applied and evaluated within other patient groups including those with long term conditions; these patients will be managed in the secondary care setting and back into the community potentially with shorter lengths of baseline hospital stay. The model may therefore require some adaptation but the underlying premise of specialist pharmacists assuming and maintaining pharmaceutical care responsibility will remain.

While the consultant pharmacist could initially have been regarded as an expensive resource, this project has demonstrated that consultant pharmacist case management resulted in cost savings and safer seamless patient care across the acute/intermediate/primary care interfaces via significant clinical interventions and increased appropriateness of drugs prescribed for older patients with complex needs. We advance this study as an important contribution to the person-centered healthcare literature.

Acknowledgements and Conflicts of Interest

This work was funded by the Northern Ireland Department of Health and Social Services and Public Safety (DHSSPSNI) and sits under the work-stream of the DHSSPSNI Regional Innovations in Medicines Management Programme Board. We declare no conflicts of interest.

References

[12] Health and Social Care Information Centre. NHS Dictionary of Medicines and Devices. Available at:


